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Indian Standard

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ठोस अपशिष्ट प्रबंधन संग्रह उपकरण — आवश्यकताएँ और मार्गदर्शिका

(पहला पुनरीक्षण)

Solid Waste Management Collection Equipment — Requirements and Guidelines

(First Revision)

ICS 13.030.10

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

November 2021 **Price Group 4**

Solid Waste Management Sectional Committee, CHD 33

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Solid Waste Management Sectional Committee, had been approved by the Chemical Division Council.

Solid waste management (SWM) consists of various stages, such as segregation, collection, transportation, processing and disposal. For management of solid waste generated by household and community, BIS published IS 16557 : 2016 ‘Solid waste management — Segregation, collection and utilization at household/community level — Guidelines’.

The refuse is collected by using different equipments, such as brooms, carts and dustbins. Dustbins at community level namely ‘community dustbins’ serves as an intermediate storage of solid wastes and from which the refuse is transported to processing or disposal site.

Generally, ‘house to house’ collection is adopted, namely, collection vehicle goes to every house and collects the refuse. Level of public awareness to the importance of solid waste management is quite appreciable and hence the citizens expect still better services. In order to give better services, civil service agencies expect more cooperation from the citizens. For this purpose, bye-laws and guidelines are framed to ensure a sanitary and hygienic process of segregation, collection, transportation, processing and disposal.

This standard was originally published in 1989. During this revision, mobile containers for transferring swept refuse from generation points to ‘community dustbin’ and primary storage bins for storage of waste at household level have been included. Besides providing guidelines related to collection equipment used in the solid waste management, this standard also covers requirements relevant to them. Hence, title of the standard has also been modified accordingly.

The composition of technical committee responsible for formulation of this standard is given in Annex A.

In reporting the result of a test or analysis, made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’.

Indian Standard

SOLID WASTE MANAGEMENT COLLECTION EQUIPMENT — REQUIREMENTS AND GUIDELINES

(First Revision)

1 SCOPE

This standard provides requirements and guidelines for collection equipment used in the solid waste management.

2 REFERENCES

The Indian Standards listed below contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate by dated or undated the possibility of applying the most recent editions of the standards.

IS No.	*Title*
1759 : 1986	Specification for Powrahs
2174 : 1962	Specification for reinforced concrete dust bins
9569 : 1980	Glossary of terms relating to solid wastes
11100 : 1984	Specification for sweeping brooms
12402 (Part 1) : 1988	Mobile containers for solid waste: Part 1 General characteristics

3 TERMINOLOGY

For the purpose of this standard, the definitions given below and in IS 9569 shall apply.

4 COLLECTION OF REFUSE

4.1 General

During collection of refuse, generally sweepers are allotted to specific areas for manual collection of refuse. A sweeper is supposed to sweep the road with his broom. With the help of a steel pan or a basket, he takes the swept refuse to a community dustbin. Such type of collection procedure requires three types of equipment, namely, brooms, collection receptacles and storage receptacles. Now days, with technological advancements, automated equipment are also in use.

4.2 Brooms-Coconut Leaf Sticks

4.2.1 *General*

These are used for sweeping the open and public areas. These can be of short handle and long handle types. Long handle brooms should be used as the worker need not bend while sweeping, leading to lesser contact of dust and lesser strain due to the straight posture while sweeping.

4.2.2 *Long Handled Brooms*

Brooms shall be made of Coconut leaf sticks tied firmly to a long wooden handle in accordance with the details given below:

Mass of the broom with rings	:	900 g
Wooden handle	:	Length = 1.25 m, Diameter = 25 to 30 mm
Rings (made of 1.0 mm mild steel sheet)	:	Width = 20 mm, Diameter = 45mm
Length of spoke of broom	:	Between 850 to 870 mm

4.2.3 *Broom without Handle*

The broom shall be made of leaf sticks 1 m in length and shall be tied firmly together.

4.2.4 *Brooms – Bamboo Strips*

Brooms made of bamboo strips shall be in accordance with IS 11100.

4.3 Collection Receptacles

4.3.1 *General*

These are used during the process of collection for transferring swept refuse from generation points to ‘community dustbin’.

Collection bins or push-carts shall be of maximum 60 litre capacity to permit safe handling and emptying. Bio-degradable waste should be first received at the doorstep in a smaller bin, such as 20 litre bin to enable pick-out of any plastic sachets, etc, before emptying it into the 60 litre bins for transport. Compost bins and biogas units may be of any type and size at users convenience.

4.3.2 *Basket-Bamboo/Cane*

The basket shall have an external diameter of minimum 500 mm and an internal depth of minimum 250 mm made out of bamboo sticks or *cane* and shall be free from any of decay and insect attack. It shall not crack in air (dry condition) on being bent to a circle of 150 mm diameter. For cane basket, the diameter of cane shall be 9 ± 3 mm. In case of bamboo baskets, the width of bamboo strip shall be 8 ± 4 mm.

4.3.3 *Steel Pans (GHAMELAS)*

Steel pans shall be made out of 0·8 mm thick galvanized iron sheet with a pan of 400 mm in diameter and 200 mm in depth**.**

4.3.4 *Spade (POWRAH)*

Spade/Powrah shall be in accordance with IS 1759.

4.3.5 *Wheel Barrows*

It has been observed that the workers have to strain more while transferring the material with the help of pans or baskets. This is mainly due to two reasons, namely:

a) The pan or basket has to be taken over the head. Hence, a worker has to work more for transferring the same amount of material; and
b) The capacity of pans or basket is limited resulting in more number of trips between generation area and community dustbins.

These results in lesser material transferred per shift. Wheel-barrows are recommended to be used for this purpose. The different types of designs commonly used are hand cart with 2 wheels and hand cart with 3 wheels. The drawings of suggested designs are given in Fig. 1 and 2 respectively.

4.3.6 *Hand Carts*

Many types of hand crafts are now days in use for transfer of waste from the point of generation to the collection point. Hand carts with removable containers are commonly in use.

4.3.7 *Mobile Containers*

Mobile containers used for door to door collection of waste shall be in accordance with IS 12402 (Part 1).

4.4 Storage Receptacles

4.4.1 *Primary Storage Bins*

Primary storage bins at household level should be of appropriate size, easy to handle, preferably of 10-15 litre capacity.

4.4.2 *Community Dustbins*

4.4.2.1 *General*

These are used for temporary storage of refuse at community level as community dustbins wherein refuse is temporarily stored after collection from generation area. These are of the following types.

4.4.2.2 *Circular bin*

Generally, these are open on both sides with two handles (1m dia × 1 m height) made out of 0·794 mm galvanized iron sheet. The bin shall be painted with anticorrosive paint on all sides. Circular bins made out of Reinforced Cement Concrete (RCC) pipe section with two mild steel bar handles can also be used. RCC circular Bins shall be in accordance with IS 2174.

4.4.2.3 *Rectangular bin*

These are rectangular shaped, generally constructed of brick masonry or RCC. The height of such dustbin shall be limited to 1 m. The cross-section varies in accordance with the available surface area. RCC rectangular Bins shall be in accordance with IS 2174.

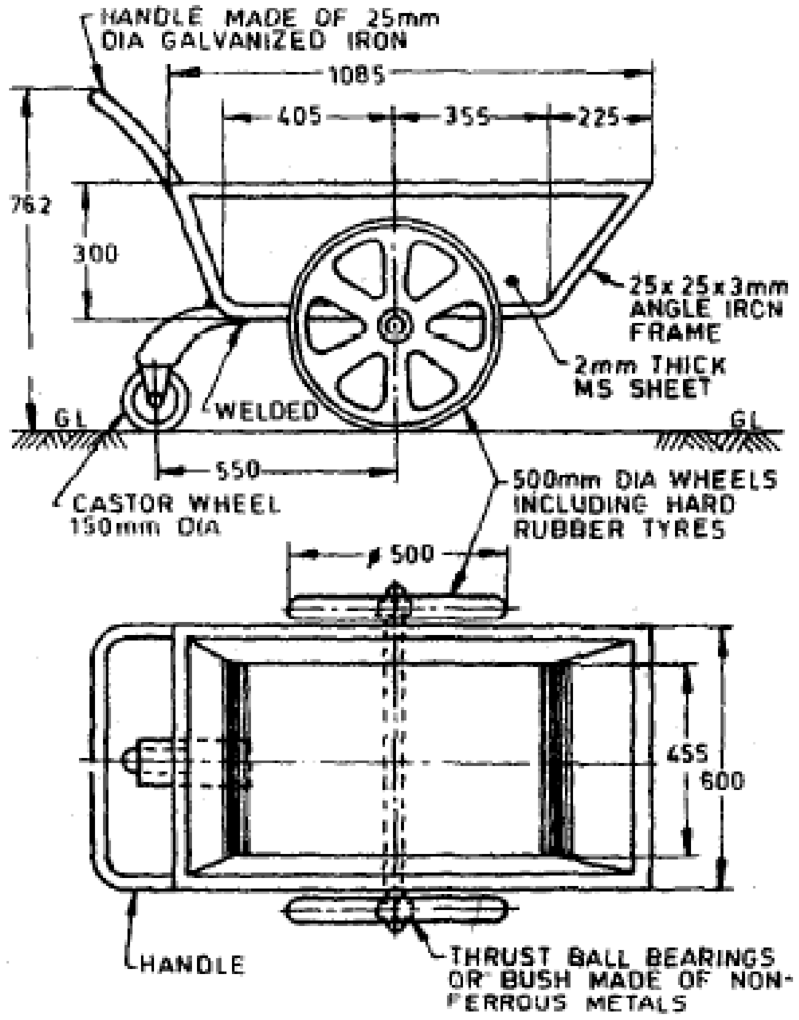
4.4.2.4 *Covered masonry bin*

These are normally provided where larger quantity of refuse has to be stored. Various designs are available *which* are known by various names in different cities. Capacity ranges up to 15 m^3. These are normally provided with two openings for deposition of waste and for its removal.

4.4.2.5 *Location spacing and number of bins*

For efficient collection, it is necessary to have community dustbins placed at suitable sites. If these dustbins are not placed properly, the generated quantity will not reach the desired location completely. This will result in reduction in efficiency of collection stage.

a) *Spacing of Bins* — The governing factors for spacing of dustbins can be detailed as follows:
    1) Availability of space for installing, a dustbin,
    2) Capacity of dustbin,
    3) Population density, and
    4) Average distance convenient to the residents and sweepers for taking the refuse to the dustbin.
b) *Location of Bins* — People are normally reluctant to have a community dustbin installed near to their place. Therefore, it is very, difficult to locate it at the most appropriate place. These dustbins are, therefore, commonly located at intersections of roads, near community garden or public utilities and similar other places.
c) *Number of Bins* — Population density plays a very important role in this aspect. Normally,


HANDLE MADE OF 25mm DIA GALVANIZED IRON
1085
405
355
225
762
300
25x 25 x 3mm ANGLE IRON FRAME
2mm THICK MS SHEET
GL
WELDED
GL
550
CASTOR WHEEL 150mm DIA
500mm DIA WHEELS INCLUDING HARD RUBBER TYRES
ø 500
455
600
HANDLE
THRUST BALL BEARINGS OR BUSH MADE OF NON-FERROUS METALS

NOTE

1 Axle as suitable to wheels

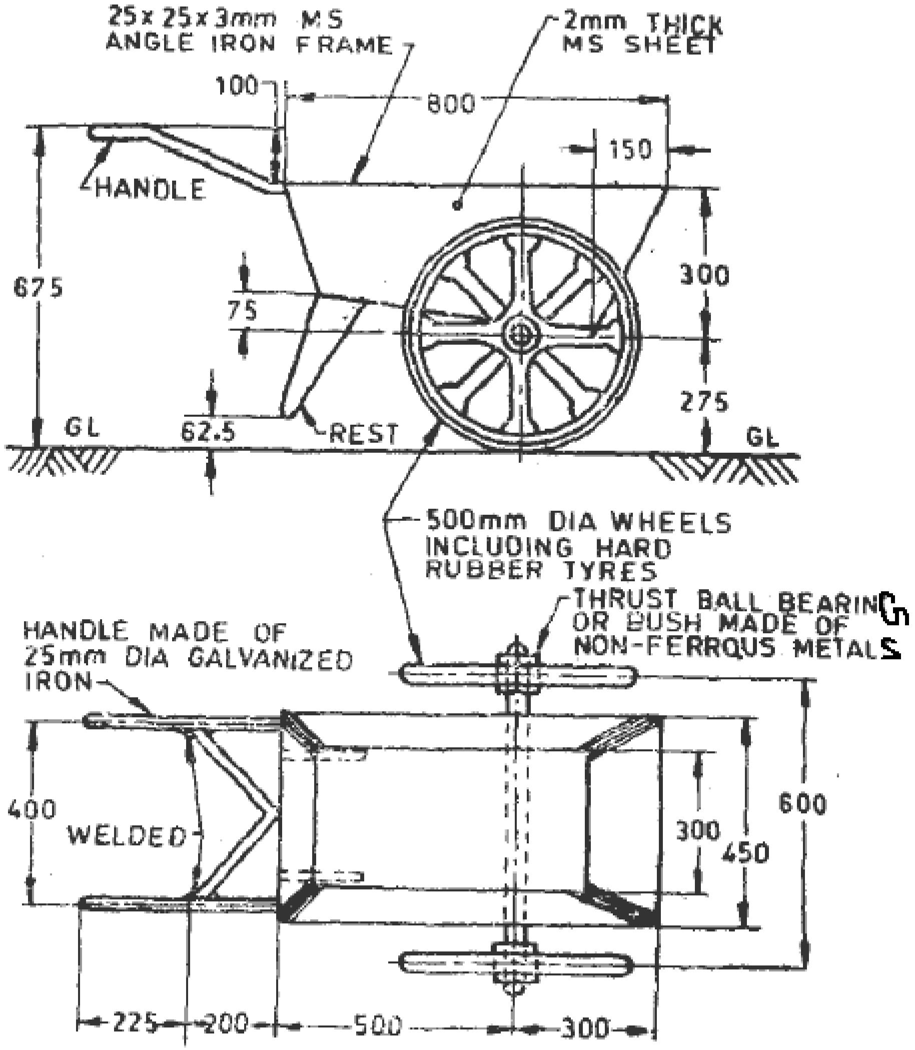
2 Outside and inside should be given anticorrosive paint

3 Wherever necessary, welding should be adopted

4 Rest to be 10 mm MS rod

All dimensions in millimetres.

FIG. 1 THREE WHEELED WHEEL BARROW


25 x 25 x 3mm MS ANGLE IRON FRAME
2mm THICK MS SHEET
100
800
150
HANDLE
675
300
75
275
62.5
REST
GL
GL
500mm DIA WHEELS INCLUDING HARD RUBBER TYRES
THRUST BALL BEARINGS OR BUSH MADE OF NON-FERROUS METALS
HANDLE MADE OF 25mm DIA GALVANIZED IRON
400
WELDED
300
450
600
225
200
500
300

NOTE

1 Axle as suitable to wheels

2 Outside and inside should be given anticorrosive paint

3 Wherever necessary, welding should be adopted

4 Rest to be 10 mm MS rod

All dimensions in millimetres

FIG. 2 TWO WHEELED WHEEL BARROW

population density varies between 500 to 2 000 persons/hectare. Dustbins of 1 m^3 capacity can accommodate 500 kg of refuse. If the frequency of refuse removal is assumed as once in three days, on daily basis about 165 kg of refuse can be stored in such a dustbin. This means that-about 400 persons can be served by this dustbin (assuming refuse generation rate of 0·4 kg/capita/day). At the population density of 500 persons/hectare, the area occupied by 400 persons will be about 0·8 hectares. If this area is considered as circular, it will have a radius of 50 m. Thus, this dustbin will be able to serve up to a distance of 50 m giving a distance of 100 m between consecutive dustbins.

As the population density reduces, the area served by a dustbin of capacity l m^3 will be more. This will result in increase in distance through which the residents/sweepers will have to transport the refuse. Obviously, this will not be accepted by the residents and will result in creation of open collection points. To avoid this phenomenon, dustbins of lesser capacity should be installed so that the average distance to be travelled is within the acceptable limits.

While fixing the spacing of dustbins, citizens co-operation should be sought and the distance to which they can willingly transport the waste ascertained. When this is done, dumping of refuse at intermediate points can be avoided to maintain a better environment.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Solid Waste Management Sectional Committee, CHD 33

Organization	*Representative(s)*
In personal capacity	Dr Anuradha Shukla (***Chairman***)
Alkali Manufacturers' Association of India	Shri K. Srinivasan Dr H. S. Das (*Alternate*)
Avantha Centre for Industrial Research, Yamunanagar	Dr Nishi Kant Bhardwaj Shri Sanjeev Gupta (*Alternate*)
Cement Manufacturers Association, New Delhi	Shri Anil Kumar Trivedi Shri P. Sreenivasa Raju (*Alternate*)
Central Pollution Control Board, New Delhi	Shri J. S. Kamyotra
Central Road Research Institute, New Delhi	Shri Guruvittal Dr Neeraj Sharma (*Alternate*)
Confederation of Indian Industry, New Delhi	Mrs Seema Arora Shri Kamal Sharma (*Alternate*)
Delhi Technological University, Delhi	Dr Rakesh Mehrotra Dr (Shrimati) Anubha Mandal (*Alternate*)
Development Alternative	Dr K. Vijaya Lakshmi Dr Soumen Maity (*Alternate*)
Engineers India Limited, New Delhi	Shri R. S. Prasad Shri Vikram Singh (*Alternate*)
Federation of Indian Chambers of Commerce and Industry, New Delhi	Ms Archana Datta Ms Suchismita Mukhopadhyay (*Alternate*)
Fly Ash Mission, Department of Science and Technology, Ministry of Science, GOI	Dr R. K. Joshi
In personal capacity	Dr N. B. Majumdar
In personal capacity	Dr Vimal Kumar
In personal capacity	Mrs Sanchita Jindal
In personal capacity	Shri Pradeep Kumar Khandelwal
Indian Centre for Plastics in the Environment, Mumbai	Shri T. K. Bandopadhyay Shri Gopal Jha (*Alternate*)
Indian Chemical Council, Mumbai	Dr N. J. Singh Shri A. A. Panjwani (*Alternate*)
Indian Oil Corporation Ltd, Faridabad	Dr M. P. Singh
Infrastructure Leasing and Financial Services	Shri Neeraj Chandra Shri Sandeep Malhotra (*Alternate*)
ITC Limited	Shri Sanjib Bezbaroa
Ministry of Defence, DRDO, New Delhi	Awaited Dr S. Mary Celin (*Alternate*)
Ministry of Environment, Forest and Climate Change	Awaited Shri E. Thirunavukkarasu (*Alternate*)
Ministry of Urban Development, New Delhi	Shri Udit Ratna Shri P. K. Duria (*Alternate*)

Organization	*Representative(s)*
National Council for Cement and Building Material, New Delhi	Shri N. K. Tiwary Shri M. Selvarajan (*Alternate*)
National Solid Waste Association of India	Shri Amiya Kumar Sahu Capt Manju Minhas (*Alternate*)
NTPC Limited, New Delhi	Dr S. K. Jain Dr Sudhir Dahiya (*Alternate*)
PHD Chamber of Commerce	Nomination Awaited
Steel Authority of India Limited, New Delhi	Dr Meenakshi Kakkar Shri Sunil Singal (*Alternate*)
Steps Pvt Ltd	Shri T. Raghavendra Rao
Sulabh International Social Service Organization	Awaited
The Energy and Resources Institute, New Delhi	Col R. K. Johri (Retd) Dr Suneel Pandey (*Alternate*)
The Fertilizer Association of India, New Delhi	Shri Manish Goswami Shri G. M. Patel (*Alternate*)
Town and Country Planning Organization, M/o Urban Development and Poverty Alleviation, New Delhi	Shri K. K. Joadder Dr Santhosh Vidyadharan (*Alternate*)
BIS Directorate General	Shri A. K. Lal, Scientist ‘E’ and Head (CHD) [Representing Director General (*Ex-officio*)]

Member Secretary

Shrishti Dixit
Scientist ‘D’ (CHD), BIS

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Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
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